COMPARATIVE TESTS OF SPUTUM BY THE KINYOUN AND ELLIMAN-ERLANDSEN METHODS.*

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In order to determine the comparative value of the Kinyoun and Elliman-Erlandsen methods for the examination of sputum, a series of tests was undertaken at Otisville during the summer of 1912.

Through the courtesy of the physicians at the Otisville Sanatorium, we were enabled to obtain samples of sputum from the sanatorium patients which we studied according to the method recommended by Dr. Kinyoun, comparing our results with those obtained by the sanatorium physicians in their regular routine examinations which are made by the Elliman-Erlandsen method.

The slightly modified Elliman-Erlandsen method in use at the sanatorium is as follows:

Sputum, mixed with an equal volume of $NaCO_3$ solution, is stirred and incubated for 24 hours at 37° C. From 2–3 drops of 40 per cent NaOH solution are added, and the mixture is boiled and centrifuged. As much as possible of the sediment is spread upon slides, in doubtful cases the entire sediment being examined.

By Dr. Kinyoun's method, the sputum is mixed with 2–3 volumes of sodium hypochlorite of such dilution as to contain 0.56 per cent of available chlorin. One cubic centimeter of ligroin is next added, the mixture thoroughly shaken until it has become homogeneous, then centrifuged, and an examination is made of the soapy layer lying directly below the ligroin, where the tubercle bacilli, if present, will be found to be concentrated. If the sputum is tenacious and not readily broken up, Dr. Kinyoun recommends allowing it to stand over night in the hypochlorite mixture, after preliminary shaking. The shaking is repeated next morning, after which the specimen is centrifuged and examined either with the ordinary carbolfuchsin stain or with the stronger stain recommended by Dr. Kinyoun:

4 gm. fuchsin, basic (Grubler)
8 gm. acid carbolic C. P. crystal
20 c.c. alcohol 95 per cent
100 c.c. water

Decolorization occurs with 3 per cent hydrochloric acid in 95 per cent alcohol. Methylene blue is used as a counter stain.

With the exception of the use of the centrifuge the foregoing method was followed exactly in our work. We first examined a series of specimens, centrifuging one-half and allowing the other

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to stand at room temperature, after shaking, until the next morning. It was found that the tubercle bacilli, if present, would be found gathered together in the soapy layer without previous centrifuging, and since, in some cases, our results were less good in the centrifuged portions than in those which had simply stood over night, the latter method was followed in our further work.

With nearly all specimens direct smears were made as soon as the sputum was received and these were compared with the smears from the hypochlorite and ligroin mixture.

The specimens were taken as they came, in the ordinary course of the daily routine sputum examinations, and were from cases in all stages of pulmonary tuberculosis. All precautions as to solutions, sterile glassware, and new slides were observed with both methods.

Comparison of direct with hypochlorite method.—By the direct method, 118 specimens, or 72.4 per cent, were positive; 45, or 27.6 per cent, were negative. By the hypochlorite method, 135 or 82.8 per cent, were positive; 28, or 17.2 per cent, were negative. Twenty, 12.2 per cent of the whole number and 44.4 per cent of those negative by direct examination, became positive with hypochlorite. Thirty-four, 20.8 per cent of the whole number and 28.8 per cent of those positive by direct examination, became more strongly positive with hypochlorite. Seventy-nine, 48.4 per cent of the whole number and 66.9 per cent of those positive by direct examination, showed no decided advantage with hypochlorite.

Comparison of the hypochlorite with Elliman-Erlandsen method.—The total number of specimens compared was 159. Four, or 0.25 per cent, were positive by Elliman-Erlandsen and negative by hypochlorite. Of this number, 1 specimen contained many organisms, and 3, a few organisms. Seventeen, or 10.6 per cent, were positive by hypochlorite and negative by Elliman-Erlandsen. Of this number, 7 contained many organisms; 1, a moderate number, and 12, few organisms.

CONCLUSIONS.

By the use of the hypochlorite and ligroin method, many specimens became positive which were negative by direct smear and many others showed a greatly increased number of organisms.

In the comparison of the hypochlorite and ligroin with the Elliman-Erlandsen method, allowance must be made for differences of technic between two sets of people working in different places, and a longer search may account for some of the differences in results where but few organisms were found. Leaving these cases out of account, however, it is still evident that in this series of tests, the advantage lies with the hypochlorite and not with the Elliman-Erlandsen method, since by the former, there were seven strongly positive tests and one showing a moderate number of organisms, all of which were negative by the other method, as compared with one strongly positive test by the Elliman-Erlandsen which was negative by the Kinyoun method.